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GEOLOGICAL SOCIETY.

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In former memoirs, Mr. Smith described the indications which he had observed of changes in the relative level of sea and land in the basin of the Clyde, by which deposits had been laid dry during an extremely recent geological epoch*; and the evidences adduced by the arctic character of several of the shells, that the climate of Scotland was colder while these beds were accumulating than it is at present†. In this paper he confines his remarks to the results of subsequent observations, which prove, that in these comparative modern deposits there are two distinct formations, differing in climate and the character of their fauna, and separated by a wide interval of time. In the lower or older of these formations, Mr. Smith has found from 10 to 15 per cent. of extinct or unknown species, and he accordingly places it in Mr. Lyell's proposed pleistocene system; whilst in the upper or newer he has found only one species which exists in the present seas, and he accordingly ranges it among the post-tertiary formations of that author. Both these deposits, however, are anterior to the recent or human period.

In the lower or pleistocene formation, Mr Smith includes the "till" or unstratified accumulation of clay and boulders, and the overlying beds of sand, gravel, and clay containing a mixture of unknown species of shells. He is of opinion that the beds presenting the same order of superposition in the basins of the Forth and the Tay, including the submarine forest of the latter, will be found to be of the same age, though nothing at present is known of their fossils, except the discovery in the elevated beds of the Tay of the *Nucula corbuloides* by Mr. Lyell; and that the parallel roads of Glenroy, recently shown by Mr. Darwin to be of marine origin, may be of cotemporaneous formation. Mr. Smith is also convinced, that a very great proportion of the superficial beds of sand, gravel, and clay are tertiary, although the evidence must sometimes be uncertain, owing to the want of organic remains.

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During the post-tertiary period, Mr. Smith is of opinion, an elevating movement to the extent of 40 feet took place, and that at this height, the relative level of sea and land remained stationary for a considerable time, exceeding the present period of repose. The proof of this, he states, is a magnificent range of inland sea cliffs, with beds of gravel and sand interposed between them and the sea*. At first Mr. Smith supposed that the beds of this period contained a small proportion of unknown species; latterly, however, he reduced the number to one, the *Arca papillosa*, which has within a few weeks been discovered recent by Capt. Portlock on the coast of Ireland.

During the existing geological epoch no change of level appears to have taken place in the Basin of the Clyde†.

To the paper is appended a list of the shells found in these beds, but not known as inhabitants of the British seas, and of which the following is a summary:—

Fossil in the Basin of the Clyde.	Fossil in other localities.	Recent in the
Tellina proxima	.....	Arctic Seas.
Crassina multicostata	Norway and Sweden.	
Withami	Wirk and Bridlington ...	Rothsay Bay.
borealis	Dalmuir	Arctic Seas.
Mya truncata, var.?	Uddevalla; Canada ...	St. Lawrence.
Pecten Islandicus	.....	North Seas; coast of Newfoundland.
Nucula oblonga.		
antiqua.		
corbuloides	Dundee; crag of Norwich.	
Mactra striata.		
Saxicava sulcata.		
Panopæa Bivonæ.....	Crag; Sicily	Yorkshire coast.
Natica clausa	Uddevalla	North Seas; coast of Newfoundland.
glaucinoides.		
fragilis	Crag.	
Nassa Monensis	Isle of Man.	
Buccinum granulatum ...	Crag.	
striatum.		
Trochus inflatus.		
Turbo expansus	.....	Arctic Seas.
Velutina undata	.....	North Seas; coast of Newfoundland.
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Nov. 20.—An extract from a letter addressed to Dr. Andrew Smith by A. G. Bain, Esq., dated Graham Town, Cape of Good Hope, Feb. 21st, 1839, and communicated by Ch. Darwin, Esq., was first read.

The object of this extract is to announce the discovery, by Mr. Martin Smith, of the piths and portions of the head of an ox in the alluvial banks of the Modder, one of the tributaries of the Orange

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A notice on the Fossil Fishes of the Yorkshire and Lancashire Coal-fields, by W. C. Williamson, Esq., was then read.

About four years ago, Mr. Williamson first met with remains of fishes in the coal-measures of Lancashire. Nearly at the same time Sir Philip Grey Egerton detected them in the Staffordshire fields; Mr. Hutton had previously found them near Newcastle; Dr. Hibbert Ware had brought them before the public in Scotland; Mr. Bowman had detected scales of Holoptychus in Wales; and two or three instances had been noticed of their existence in the coal-fields of Yorkshire. Since that period, however, the coal-measures of Lancashire and Yorkshire have proved to be exceedingly rich in Ichthyolites. In the former, they occur throughout the whole series from the Ardwick limestone to the millstone grit; and at Middleton colliery, near Leeds, they have also been found in considerable quantity. At that locality there are three seams of coal, but only two are wrought. The following is a general section of the pits:—

Fish coal	14 inches.
Interval	60 yards.
Yard coal	3 feet.
Interval	32 yards.
Main coal	$4\frac{1}{2}$ feet.

Ichthyolites occur in the shale in connexion with all the seams, but principally in the uppermost one, to which the colliers have in consequence given the name of Fish Coal. They are contained in a fine bituminous shale, and in greatest abundance at the junction of the roof with the coal, where a very thin seam of coprolitic matter occurs. The author has obtained from it the following remains:—

Teeth of *Diplodus gibbosus* and *Ctenoptychus pectinatus*; scales jaws, and teeth of *Megalichthys Hibbertii*, and of another smaller species; rays of *Gyracanthus formosus*; scales, fins, and other portions of two species of Holoptychus, of a species of Acanthodes, or Cheiracanthus? of a species of Platysomus; three kinds of Ichthyodorulites, and other remains of which he has not yet determined the genera.

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The yard coal shale is still less fruitful than either of the other seams, and has yielded only a few small teeth of Holoptychus, Ctenoptychus, and some other unimportant fragments.

On comparing these fossils with the Ichthyolites which he has found in Lancashire, the author has ascertained that many are identical, but that others differ. The species of Diplodus, Ctenoptychus, Megalichthys, Gyracanthus, one of Holoptychus? and Platysomus ? exactly correspond in each district. In the Lancashire field he has found remains of *Ctenoptychus apicalis* and *C. denticulatus*, which he has not noticed in the Yorkshire; and he is inclined to think, that the former field is characterized, if there be a difference, by the greater prevalence of Lepidoid fishes, and the latter by those of the Sauroid family.

The Ichthyolites occur chiefly in highly bituminous shales, with the exception of the Ardwick limestone, and most abundantly where it is finely grained. They are rarely associated with any quantity of vegetable remains; and this disposition of the two kingdoms, Mr. Williamson is of opinion may assist in determining the conditions under which the coal-measures were deposited. The Ichthyolites also are in general more common in the roof than the floor of the coal; but in the cannel-seams of Wigan in Lancashire, and in the thin seams connected with the limestones at Ardwick, they are most abundant in the floor. They are rarely found in the coal itself, and the instances in which they have been met with in that position by the author, have been chiefly in the Middleton colliery.

The manner in which Ichthyolites are associated with other remains, Mr. Williamson states, is well worthy of attention. At Burdiehouse they occur in the midst of Unios, Cyprides, and *Microconchus carbonarius*; at Colebrook Dale, with species of Orbicula, Trochus, Nautilus, Orthoceras, and Conularia; in the lower measures of Lancashire in beds nearly associated with those containing *Goniatites Listeri* and *Pecten papyraceus*; in the higher measures of Lancashire and in Yorkshire, with Unionidæ and Entomostraca; at Middleton, with Lingulæ; at the top of the series in Lancashire and Derbyshire, with Mytili.

TWEEDSIDE PHYSICAL AND ANTIQUARIAN SOCIETY.

The stated quarterly Meeting of the Society was held on November 18, in the Library room, Kelso. The Duke of Roxburgh presided; and the meeting was very numerous and encouraging, great

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